

Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

Staff Report

**Proposed Amendments to
BAAQMD Regulation 8, Rule 5:
Storage of Organic Liquids**

September 18, 2006

Prepared by:

**J. Julian Elliot
Senior Air Quality Engineer**

**William H. Guy
Assistant Counsel**

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY	2
2.0 BACKGROUND	3
3.0 PROPOSED RULE AMENDMENTS	8
4.0 EMISSIONS AND EMISSIONS REDUCTIONS	13
5.0 ECONOMIC IMPACTS	15
6.0 ENVIRONMENTAL IMPACTS.....	17
7.0 REGULATORY IMPACTS	17
8.0 RULE DEVELOPMENT PROCESS.....	18
9.0 CONCLUSION	18
10.0 REFERENCES.....	19
APPENDIX I.0 COMMENTS AND RESPONSES	20

1.0 Executive Summary

The proposed amendments to Bay Area Air Quality Management District (“BAAQMD” or “District”) Regulation 8, Rule 5: *Storage of Organic Liquids* will implement the emission reduction measures in Control Measure SS 9 (“*Organic Liquid Storage Tanks*”) in the Bay Area 2005 Ozone Strategy and make other improvements to the rule. Control Measure SS 9 proposes to reduce reactive organic gas (ROG) emissions from storage tanks by supplementing existing requirements in Rule 8-5. The major proposed amendments would:

1. Clarify Exemptions for Tanks at Gasoline Stations

The proposed amendments clarify an exemption in Rule 8-5 for gasoline dispensing tanks subject to Regulation 8, Rule 7: *Gasoline Dispensing Facilities*. Rule 8-7 subjects these tanks to equal standards.

2. Create a New, Voluntary Self-Inspection and Maintenance Program

This amendment seeks to reduce emissions, not by imposing new standards or by making existing standards more stringent, but rather by reducing excess emissions that result from the most common, minor problems found on large floating roof tanks. The program will increase the inspection frequency at floating roof tanks at a facility, thereby reducing the potential amount of time that a non-complying condition could cause excess emissions.

3. Add New Structural Integrity Requirements

The proposed amendments include a prohibition on liquid leaks through tank shells and emission control requirements on leaking flotation pontoons on floating roof tanks.

4. Add New Requirements for Tank Cleaning

The proposed amendments add new limits on the organic content of cleaning agents used on tank interiors and impose containment standards for sludge removed from tanks during cleaning.

5. Improve Monitoring of Tank Degassing Operations

Rule 8-5 currently includes an annual source test requirement for emission control equipment used during tank degassing operations. The proposed amendments replace this annual testing requirement with a requirement to monitor emission control effectiveness during each degassing operation.

The proposed amendments will codify best industry practices and improve rule enforceability. Because new emission controls are not being proposed, emission reductions for these amendments are difficult to quantify. However, an overall improvement in rule effectiveness, primarily related to the proposed self-inspection and maintenance program, is expected to result in an emission reduction of about 0.03 tons per day of organic compounds.

The rule development process for the proposed amendments included workgroup meetings and a public workshop in July 2006. A socioeconomic analysis of the proposed amendments concludes that the amendments would not have significant economic effects. An initial study of the proposed amendments concludes that the rule amendments would not cause significant environmental impacts, and a CEQA negative declaration is proposed for adoption.

2.0 Background

2.1 Source Description

Tanks regulated by Rule 8-5 are used for bulk storage of organic liquids or liquid mixtures containing organic compounds. Such tanks are typically found at petroleum refineries and chemical plants, as well as gasoline bulk plants and terminals. Underground gasoline tanks located at gasoline stations are regulated separately by BAAQMD Regulation 8, Rule 7. Tanks regulated by Rule 8-5 have one of four basic designs: fixed roof, pressure, external floating roof and internal floating roof.

Figure 1 shows a typical large fixed roof tank. The pressure/vacuum vent is designed to remain closed as long as the tank pressure deviates from atmospheric pressure by a small amount, such as when daytime temperatures cause the tank pressure to rise slightly, or when cooler night temperatures cause a slight tank vacuum. However, large pressure variations, such as those caused by draining a large quantity of liquid from the tank or by adding a large quantity of liquid to the tank, may cause the vent to open, thereby releasing organic vapors to the air or admitting air into the tank where it becomes saturated with organics. The pressure/vacuum vent is the only emission point on a fixed roof tank.

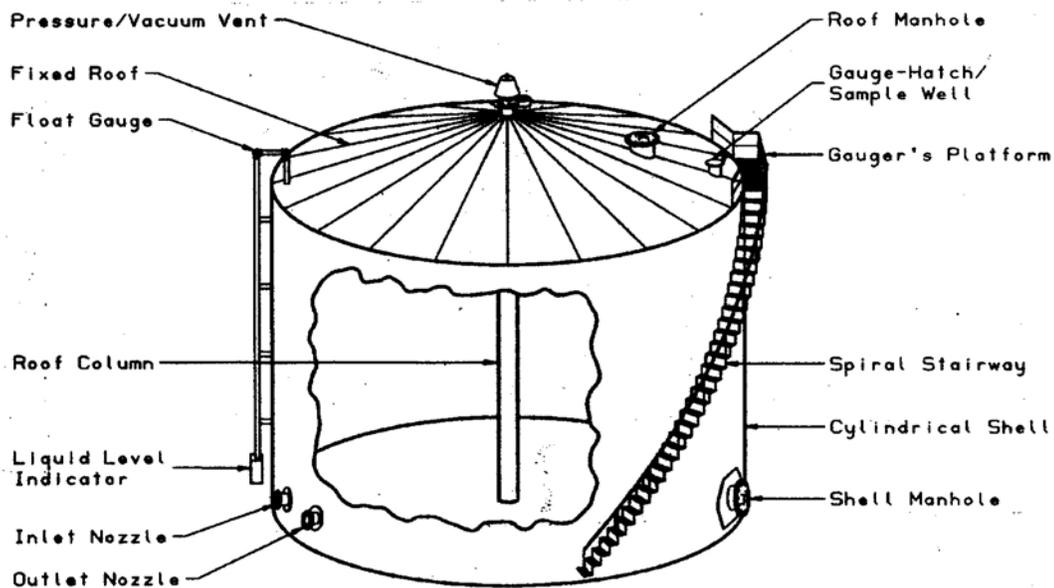


Figure 1. Fixed Roof Tank (source: U.S. EPA)

Pressure tanks operate in the same way as fixed roof tanks, but are designed to store high-pressure liquids. Pressure tanks are typically long cylinders with hemispherical ends oriented horizontally rather than vertically. Pressure tanks are sealed without emission points except for pressure relief devices and piping components, such as valves and connectors, used to transfer liquid to and from the tank.

Figure 2 shows a typical external floating roof tank (EFRT). An EFRT has a cylindrical shell with no fixed roof or cover. Instead, the roof floats on top of the liquid and moves up and down as the liquid level changes. Because there is no vapor space between the roof and the surface of the stored liquid, tank pressure does not rise when liquid is added to the tank and vapors are not expelled from the tank, as they are with a fixed roof tank. However, a floating roof design has two emission points not found on fixed roof tanks: vapor leaks from rim seals and roof fittings. Organic liquid may evaporate in the space between the outer edge of the floating roof and the inside tank wall. Although rim seals of various designs are used to reduce these emissions, some organic vapors are emitted at these rim seals. Roof fittings such as deck legs, guidepoles and sample hatches penetrate the roof and provide a potential route for evaporative emissions to occur. Although cover gaskets and other closure mechanisms may reduce these emissions, some organic vapors are emitted at roof fittings. Nonetheless, a floating roof tank typically reduces overall emissions 60% to 99% more than a fixed roof tank in the same service.

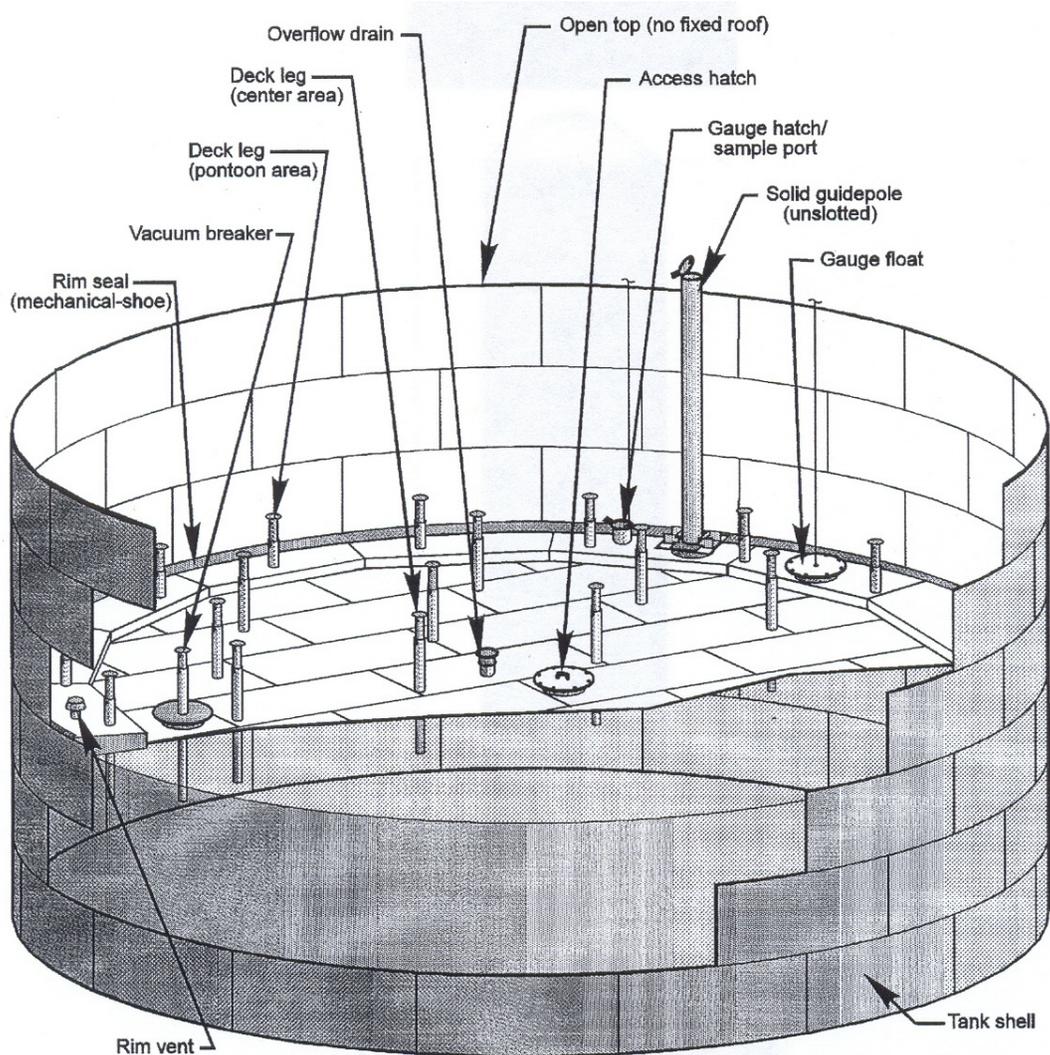


Figure 2. External Floating Roof Tank (source: U.S. EPA)

Figure 3 shows a typical internal floating roof tank (IFRT). An IFRT is basically an EFRT with an additional fixed roof on top of the tank shell. The emission mechanisms for an IFRT are the same as for an EFRT, but the fixed roof eliminates wind exposure at the floating roof rim seal and roof fittings. Because wind exposure increases the emission rate at these points, an IFRT will have a lower emission rate from the rim seal and roof fittings compared to an otherwise identical EFRT. However, because the fixed roof creates a potentially dangerous environment by allowing organic vapors to concentrate above the floating roof, IFRTs are subject to much less stringent inspection requirements than EFRTs and their floating roofs are not easily accessible for preventative maintenance.

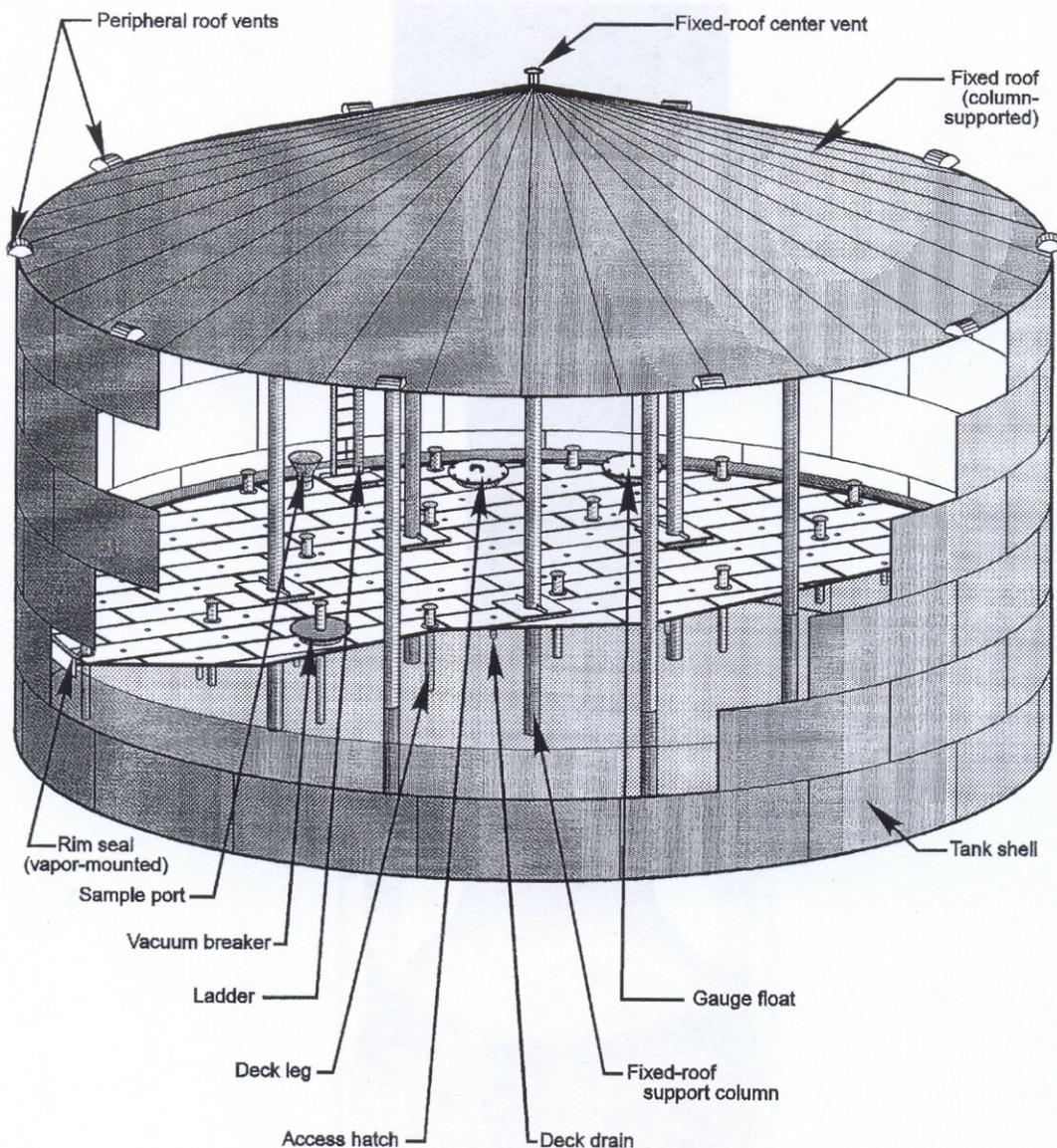


Figure 3. Internal Floating Roof Tank (source: U.S. EPA)

BAAQMD data show that there are 3,282 tank sources within the District, including both permitted tanks and tanks that are exempt from permit requirements. This total includes internal floating roof tanks (IFRTs), external floating roof tanks (EFRTs), fixed roof tanks and pressure tanks, but excludes fuel tanks at retail service stations. This total also includes tanks that primarily hold water or inorganic liquids. An estimated 499 tanks have floating roofs. Most floating roof tanks have welded shells, but an estimated 31 tanks have riveted shells. Rivets in the tank shell reduce the effectiveness of floating roof rim seals compared to a welded tank shell. Table 1 provides a summary of tanks in the Bay Area.

Table 1 - BAAQMD Tank Inventory	
Fixed Roof Tanks	2,636 (at 294 facilities)
Floating Roof Tanks	499 (at 33 facilities) 309 EFRTs (18 riveted) 190 IFRTs (13 riveted)
Pressure Tanks	147 (at 25 facilities)
Total Tank Sources	3,282 (at 301 facilities)

About 50% of the 3,282 total tank sources are classified as exempt from permit requirements, either because they are very small or because they do not store liquids that contribute significantly to air pollution. Only 47 facilities have 10 or more tanks, and these 47 facilities account for about 73% of the total tanks and about 95% of the floating roof tanks.

In the Bay Area 2005 Ozone Strategy, the BAAQMD estimates that ROG emissions from storage tanks are 5.26 ton/day in 2006, including tank cleaning emissions for tanks located at petroleum refineries.

2.2 Rule History

Regulation 8, Rule 5 limits organic emissions from liquid storage tanks. The rule primarily affects petroleum refineries, chemical plants and bulk gasoline terminal distribution facilities, but may affect other facilities that store large quantities of organic liquid. Rule 8-5 was originally adopted in 1978 and has been amended a number of times, most recently on November 27, 2002. By the time of the January 1, 1993 amendments, Rule 8-5 already included most of the current provisions including the basic emission control strategies, gap standards for floating roof rim seals, closure requirements for tank roof fittings and tank degassing requirements. Since 1993, Rule 8-5 has been the most stringent storage tank rule in California with respect to these emission sources, although emissions related to tank cleaning were not addressed. The proposed amendments will impose standards to limit emissions during tank cleaning operations, and will also create an innovative, voluntary self-inspection and repair program and make other improvements to Rule 8-5.

2.3 Control Measure SS 9

Control Measure SS 9 (“*Organic Liquid Storage Tanks*”) in the Bay Area 2005 Ozone Strategy was based on the recommendations in the Technical Assessment Document (TAD) for organic liquid storage tanks that was published by the BAAQMD in January, 2004. The TAD studied the emission reduction measures suggested by Further Study Measure FS-10 in the Bay Area 2001 Ozone Attainment Plan.

Control Measure SS 9 proposes to improve standards for “degassing and cleaning tanks and for storing and transporting removed sludges”, and also to implement a self-inspection and maintenance provision to provide “an incentive for more frequent tank inspections.” Each of these emission reduction measures is incorporated in the proposed amendments.

3.0 Proposed Rule Amendments

This chapter describes the substantive proposed amendments to Rule 8-5. Proposed amendments that are not described here are editorial.

3.1 New Exemption for Aboveground Gasoline Storage Tanks

Amended Section 8-5-116

Exemption 8-5-116 applies to “... *any underground gasoline storage tank located at a gasoline dispensing facility subject to the requirements of Regulation 8, Rule 7.*” This exemption was added in 1993 to prevent conflicts between California Air Resources Board (CARB) requirements and standards in Regulation 8, Rule 7: *Gasoline Dispensing Facilities*. Because both Rule 8-5 and Rule 8-7 specify pressure setpoints at which pressure vacuum valves will automatically operate, and because these setpoints are different for underground tanks in the two rules, an exemption is necessary in one of the rules to prevent a conflict. This exemption is provided for underground tanks, but not for aboveground tanks, because the setpoints for aboveground tanks are the same in Rules 8-5 and 8-7. However, Rule 8-7 allows the setpoints specified in that rule to be superseded by a CARB order. If the CARB setpoints are not the same as the setpoints in Rule 8-5, then a conflict would occur. For this reason, and because Rule 8-7 already regulates both aboveground and underground gasoline tanks at gasoline dispensing facilities, it is appropriate to exempt both types of tanks from Rule 8-5. The proposed amendment of Section 8-5-116 extends this exemption to include aboveground gasoline tanks.

3.2 Voluntary Self-Inspection and Repair Program

New Sections 8-5-119, 411; modified Sections 8-5-401, 402, 403

Rule 8-5 includes the most stringent seal gap standards and fitting standards for floating roof tanks of any rule in the country. As the stringency of the rule has increased, so has the difficulty in finding opportunities for further emission reductions. One opportunity is the reduction of the number and duration of minor violations of the rule’s standards by increasing the tank inspection frequency. More frequent inspections would identify damaged or worn tank components that would eventually lead to violations of rule standards and excess air emissions if they were not identified and repaired. Also, more frequent inspections would reduce the maximum amount of time that a non-complying condition produced excess emissions. Because Rule 8-5 already imposes frequent inspections and because the number of standard violations identified on tanks is not excessive, simply increasing the inspection frequency further for all tanks would not be cost-effective. Therefore, in order to encourage tank operators to undertake additional inspections voluntarily, and to target these inspections on those tanks that are most likely to benefit from additional inspections based on operators’ knowledge of tank condition, the proposed amendments include a voluntary self-inspection and maintenance program with the following elements:

- 25% of the tanks at a facility, chosen by the operator, must have double the number of operator-conducted inspections normally required by the rule;
- Minor non-complying conditions discovered by a tank operator at any facility tank are not subject to enforcement action if repairs are made within 48 hours;

- Minor non-complying conditions discovered by BAAQMD inspectors on any facility tank continue to be subject to enforcement action.

3.3 New Structural Integrity Requirements for Tank Shells, Flotation Pontoons and Pressure Relief Devices

New Sections 8-5-225, 303.1, 304.5, 304.6, 305.6, 307.1, 320.7, 412

3.3.1 Good Operating Condition

Rule 8-5 currently requires that floating tank roofs and certain tank fittings be in “good operating condition”, although this term is not defined. In order to clarify the meaning of this standard, the proposed amendments include a definition of “good operating condition”. Also, the proposed amendments extend this standard to all tank roofs and also to tank shells and to pressure relief devices.

3.3.2 Floating Roof Flotation Pontoons

The roofs on floating roof tanks are made buoyant by pontoons that are part of the roof structure and that are typically arranged along the outer circumference of the roof. These pontoons are formed from welded steel sheets that are divided into individual compartments and are typically provided with loose-fitting covers that are accessible from the roof deck. Occasionally, a pontoon weld will crack at a point that is below the stored liquid level, allowing organic liquid to seep into the pontoon compartment. Evaporation of this liquid creates an organic vapor space inside the pontoon and results in organic emissions at the pontoon cover.

Currently Rule 8-5 does not explicitly address leaking pontoons, although the BAAQMD has considered such leaks to be a violation of the “good operating condition” requirement for floating roofs when they have occurred in the past. The proposed amendments make explicit the prohibition against uncontrolled, leaking pontoons, and specify required emission controls for leaking pontoons. Leaking pontoons, once discovered, must have their covers and any other openings sealed to a “gas tight” standard, must be inspected on a monthly basis once sealed, and must be permanently repaired at the next tank overhaul.

3.4 Monitoring of Emission Controls During Tank Degassing

New Sections 328.3, 605.2; Modified Sections 8-5-328.1, 502.2, 603.2

Tank degassing is the process of removing organic vapors from the interior of a tank that has been drained of organic liquid prior to opening the tank to the atmosphere. Degassing is the first step in making the tank interior safe for workers. Rule 8-5 currently requires that organic gas emissions from degassing be reduced by at least 90% and that emission control continue until the residual organic concentration in the tank falls below 10,000 ppm. At refineries, where waste gases are routinely collected for use as fuel, the organic gases may be vented to a fuel gas collection system. Residual gases may also be converted to a liquid form with a condenser and re-used, captured with a carbon adsorbent, or destroyed with an internal combustion engine or an oxidizer. Rule 8-5 currently requires that an abatement device used to control degassing emissions must undergo an annual source test.

Although the standards for tank degassing in Rule 8-5 are at least equivalent to the strictest in the state, the monitoring associated with these standards could be strengthened. First, Rule 8-5 does not include a requirement that a tank operator measure or record the residual organic concentration in a tank to allow verification that the 10,000 ppm target concentration was reached and maintained. Secondly, the annual source test that is currently required for degassing emission control systems provides limited assurance that the system will provide the required emission reduction under different conditions than those that existed during the source test. For example, a portable condenser system that provided an acceptable emission reduction efficiency when controlling degassing emissions from a gasoline tank might not achieve the required efficiency when used on a tank that stored a different liquid.

In order to address these issues, the proposed amendments add a 3-day prior notification requirement for degassing operations and a monitoring requirement for the 10,000 ppm residual concentration using a hand-held analyzer. Also, the annual source test requirement is replaced with a requirement to monitor actual emission control effectiveness periodically during degassing operations. This monitoring provision is based on a similar provision that appears in Ventura County APCD Rules 24-6 and 24-7.

3.5 New Tank Cleaning and Sludge Handling Standards

New Sections 8-5-331, 332, 606

After a tank has been degassed, the interior is vented of residual organic gases prior to being cleaned internally. Cleaning removes accumulated sludge from the tank and allows the tank interior to be inspected and repaired. Sludge may adversely affect the quality of material stored in the tank and may accumulate to the point that the working capacity of the tank is significantly reduced. Rule 8-5 does not currently address emissions from tank cleaning operations and no other BAAQMD rule regulates the cleaning of tank interiors. Other California air districts, including the San Joaquin Valley Unified APCD (Rule 4623), the South Coast AQMD (Rule 1149) and the Ventura County APCD (Rule 74.26) do address these potential emissions. In general, these rules require that the residual organic concentration or vapor pressure in the tank must be reduced to some target level through degassing, with this concentration or vapor pressure maintained during subsequent cleaning operations, or that the emissions during cleaning be abated.

Because Rule 8-5 does not require emission controls during cleaning, as it does during degassing, the use of cleaning agents that contain significant levels of organic compounds could negate the benefits of controlling degassing emissions. Also, the use of steam as a cleaning agent tends to heat and vaporize organic liquids that might otherwise be removed from the tank as a liquid or semi-solid sludge, thus increasing the level of emissions during cleaning. The proposed amendments impose limitations on the organic content of cleaning agents and the use of steam cleaning. The limitations are based on new standards in the May 2005 amendments to San Joaquin Valley Unified APCD Rule 4623. The proposed amendments also add containment standards for sludge removed from tanks during cleaning.

3.6 Other Amendments

3.6.1 New Sections 8-5-111.6, 112.5

New notification requirements are proposed to be added to limited exemptions in Sections 8-5-111 and 112. These requirements apply only in the event the tank operator discovers a condition that violates a standard of Rule 8-5. Such a notification is important because both of these limited exemptions require a tank to be in compliance with the rule when they are invoked.

3.6.2 New Section 8-5-112.6

At the request of U.S. EPA, a report requirement is proposed to be added to the limited exemption in Section 112.

3.6.3 New Section 8-5-118

This section clarifies the applicability of Rule 8-5 relative to Regulation 8, Rule 18: *Equipment Leaks*. Both rules include standards that limit equipment leaks.

3.6.4 Amended Section 8-5-206

The current definition of “gas tight” in Rule 8-5 allows concentrations of organic gases at leaking equipment to be measured as much as 1 centimeter from the leak. However, Rule 8-5 also requires that leak concentrations be quantified using U.S. EPA Reference method 21, which does not allow a 1 cm gap. In order to correct this inconsistency, the 1 centimeter allowance is deleted in the proposed amendment.

3.6.5 Amended Table in Section 301

The deletions in the second and third rows of this table are editorial. Section 301 specifies that a tank of a particular size that stores a liquid in a particular vapor pressure range may use the emission control measures specified for that tank and liquid, or may use measures specified for larger tanks or for tanks storing liquids in a higher vapor pressure range. Because of this, the deleted text in the second and thirds rows is duplicative. This is an editorial change.

The deleted text in the first row and the added text in the third row is a correction to the rule amendment adopted in November 2002. In that amendment, rule standards were put into the tabular format that is currently used. However, when this format change occurred, a compliance option for the two smallest tank size categories was inadvertently deleted. Tanks in these two size categories that store liquid with a true vapor pressure greater than 1.5 psia and less than 11 psia were allowed, prior to the 2002 amendment, to use a submerged fill pipe as a minimum emission control technology, if they were in the service specified. This change was inadvertent and was not discussed in the staff report for the 2002 amendment. No tank operators submitted permit applications to retrofit affected tanks with more effective emission control technology, and BAAQMD staff are unaware of any tanks that were subsequently retrofitted. Therefore, reversing this error will not allow any tank to revert to a lower level of emission control and this change is editorial.

3.6.6 Amended Section 8-5-303.2, 304.4, 305.5

The proposed amendments delete the requirement that pressure vacuum valves and floating roofs be “properly installed and properly maintained”. Rule 8-5 includes adequate monitoring to ensure compliance with all rule standards. The requirement for proper installation and maintenance is unnecessary.

3.6.7 New Sections 307.3, 320.7; Amended Section 8-5-303.2

Pressure vacuum valves and other pressure relief devices are required to have a sealing mechanism that is “gas tight” and are required to be monitored for compliance with this standard. However, when a sealing mechanism is vented to a fuel gas collection system or other control device that maintains a high emission control efficiency it may be impossible to verify compliance with this standard, and compliance becomes much less important than if the sealing mechanism is vented to the atmosphere. Therefore, the proposed amendments exempt pressure relief devices from the “gas tight” requirement when any leaks would be vented to a system that proves at least 95% abatement efficiency.

3.6.8 Amended Section 8-5-320.5.2

This proposed amendment is a correction to the rule amendment adopted in November 2002. Prior to that amendment, this section was applicable only to external floating roof tanks. In 2002 this section was amended to delete the qualifier “on an external floating roof”. This change was inadvertent and was not discussed in the staff report for the 2002 amendment. No tank operators submitted permit applications to retrofit internal floating roof tanks, and BAAQMD staff are unaware of any tanks that were subsequently retrofitted. Therefore, reversing this error will not allow any tank to revert to a lower level of emission control and this change is editorial.

3.6.9 Amended Section 8-5-328.1

The proposed amendments delete the reference to liquid balancing as a control option for tank degassing. As defined in the rule, liquid balancing is a method of making a tank exempt from the requirements of the rule by reducing the true vapor pressure of the stored liquid to less than 0.5 psia. As such, liquid balancing is not a control option for degassing; it is a way to make the tank exempt from the degassing control requirements, as well as the rest of the rule. This proposed deletion will not disallow liquid balancing; it will simply delete this inappropriate reference. This change is editorial.

3.6.10 Amended Section 8-5-603.1

The proposed amendments replace test method ST-4 with ST-7. Method ST-4 has been superseded by ST-7 in the BAAQMD Manual of Procedures.

4.0 Emissions and Emissions Reductions

4.1 Introduction

Control Measure SS 9 (“*Organic Liquid Storage Tanks*”) in the Bay Area 2005 Ozone Strategy estimates 5.08 tons per day of total organic compound emissions from tanks in 2003, with a forecast of 5.26 tons per day in 2006, with 70% of these emissions occurring at the five Bay Area refineries. These emissions do not include emissions from tank degassing or cleaning or emissions related to putting tanks into service or removing them from service.

Tanks subject to Rule 8-5 may be categorized as either fixed roof or floating roof tanks. (Although there are also a significant number of pressurized tanks in the District, these represent a small fraction of the total emissions from tank sources.) The design of fixed and floating roof tanks is described in Section 2.1. Fixed roof tank emissions - which occur when organic vapor is forced out of the tank as liquid is added to the tank or the tank internal pressure otherwise increases - are controlled with pressure vacuum valves. These devices allow a small amount of vacuum or positive pressure to develop in the tank before they open to the atmosphere to relieve the pressure differential. Fixed roof tanks should be operated so that the pressure vacuum valve does not actuate under normal operating conditions - tank pressure increases as the tank heats up or is filled, and decreases as the tank cools or is drained - with the pressure vacuum valve keeping the tank sealed from the atmosphere under these minor pressure variations. However, a fixed roof with a pressure vacuum valve does not prevent emissions during operations that cause large pressure variations in the tank. Therefore, any tank subject to Rule 8-5 is required to use a more effective level of control than a pressure vacuum valve - either a floating roof design or vapor recovery of emissions from a fixed roof tank - if the tank capacity is 39,626 gallons or more, or if the tank capacity is 19,803 gallons or more and the true vapor pressure of the tank product exceeds 1.5 psia.

Floating roof tanks provide a higher level of control than fixed roof tanks because they do not allow a vapor space to form below the tank roof. Even if a floating roof tank undergoes large swings in stored liquid volume, the tank does not expel large volumes of gas as it fills and does not draw in large volumes of air (which would become saturated with organic gases and later expelled) as it empties. The floating roof is a safe, passive, emission-prevention technology and therefore has significant cost advantages over vapor recovery systems which are mechanically complex and require fuel or electrical power. In addition, floating roofs create no secondary emissions, as do combustion-based and adsorbent-based control technologies. Floating roofs do have unique emission mechanisms, such as those resulting from roof fittings used only on floating roofs, as well as withdrawal losses (evaporation of liquid from the inside tank walls as the roof level drops). Nonetheless, floating roofs reduce emissions compared to a fixed roof in the same service by a factor of 60% to 99%, according to U.S. EPA’s *Compilation of Air Pollutant Emission Factors, AP-42, Volume I: Stationary Point and Area Sources*. Tanks subject to Rule 8-5 would be expected to be at the higher end of this range because of the stringent fitting closure requirements and seal gap standards in this rule.

Because of the high level of control required by Rule 8-5, additional cost-effective emission reductions at storage tanks have become increasingly difficult to achieve. The 1993 amendments to the rule achieved an estimated emission reduction of organic compounds between 2 and 3 ton/day by imposing standards for tank degassing and more stringent seal gap and fitting closure standards for floating roof tanks. The 1999 amendments achieved an estimated emission

reduction of 0.87 ton/day, primarily by imposing closure standards for slotted guidepoles on floating roof tanks. The 2002 amendments achieved an estimated emission reduction of 0.13 ton/day, primarily by doubling the required inspection frequency for external floating roof tanks.

Because it is sometimes difficult to forecast emission reductions in a control measure description in cases where adequate data may be available only during later rule development, the 2005 Ozone Strategy does not include an estimate of potential emission reductions from Control Measure SS 9.

4.2 Emission Reductions from Proposed Amendments

4.2.1 Voluntary Self-Inspection and Repair Program

As discussed in Section 3.2, this proposed, new program will double the inspection frequency at 25% of the tanks at a facility that uses this program, while requiring that non-complying conditions that are discovered be repaired within 48 hours. The tanks that will undergo additional inspections are chosen by the facility operator, but all of the external floating roof tanks at a facility must be included in the program before any other tank type is selected. This requirement is proposed because external floating roof tanks have the largest number of components that may potentially violate a rule standard, and therefore are the tank type most likely to benefit from additional inspections. (Although internal floating roof tanks also have a large number of components that are subject to rule standards, most of these are located under the tank's fixed roof (see Figure 3) and therefore are not normally accessible for close inspection, and probably could not be repaired within 48 hours.) Because self-discovered minor violations of rule standards are not subject to enforcement action by the BAAQMD under the proposed program, tank operators are expected to perform additional inspections on those tanks that are most likely to have compliance issues. Because tank operators would be allowed to change the specific tanks that are subject to additional inspections, they are also expected to adjust their tank selection so that inspection resources are always directed at those tanks that are most likely to benefit from additional inspections.

As discussed in Section 3.2, these additional, targeted inspections are expected to reduce emissions in two ways: by identifying and repairing or replacing damaged or worn tank components that would eventually lead to violations of rule standards and excess air emissions, and also by reducing by half the maximum amount of time that a non-complying condition produces excess emissions. A properly designed and executed program that stresses preventative maintenance could greatly reduce excess emissions, and attendant violation notices, for the tank operator.

The BAAQMD has estimated 1.36 tons per day of organic emissions from external floating roof tanks. The expected reduction in the incidence of non-complying conditions and of the duration of non-complying conditions is expected to result in a minor reduction in emissions at external floating roof tanks. An emission reduction of about 2% would be equivalent to a reduction of 0.03 ton/day of organics.

4.2.2 New Structural Integrity Requirements

The proposed prohibitions on tank shell integrity are not expected to result in significant emission reductions because tank shell leaks are very uncommon. Leaks on floating roof flotation pontoons are less uncommon, and such leaks have previously been prohibited as a

violation of the “good operating condition” requirement for floating tank roofs. As discussed in Section 3.3.2, the proposed amendments will make explicit the prohibition against uncontrolled, leaking pontoons, and specify required emission controls for leaking pontoons. Because uncontrolled, leaking pontoons have been prohibited in the past by the BAAQMD, no emission reduction estimate is provided for this proposed amendment.

4.2.3 New Tank Cleaning and Sludge Handling Standards

As discussed in Section 3.5, the proposed amendments impose limitations on the organic content of cleaning agents and the use of steam cleaning, and also add containment standards for sludge removed from tanks during cleaning. Based on discussions with representatives of the five Bay Area refineries, it appears that tank cleaning operations already generally comply with these requirements. Also, state and federal hazardous waste regulations already impose handling requirements on most sludge removed from tanks. Sludge that is recycled on the site where it is generated may be exempt from these hazardous waste regulations, and only this small fraction of produced sludge will be affected by the proposed handling requirements.

The BAAQMD emission inventory estimates only 0.05 tons per day of ROG emissions (at petroleum refineries only). Because the emission inventory amount for tank cleaning is quite small and because only a fraction of removed sludge will be subject to new requirements because of the proposed amendments, no emission reduction estimate is provided for these amendments.

4.2.4 Monitoring of Emission Controls During Tank Degassing

Because the proposed amendments related to monitoring of tank degassing do not impose new emission control standards, no emission reduction estimate is provided for these amendments.

4.2.5 Other Amendments

Because the other proposed amendments do not impose new emission control standards, no emission reduction estimate is provided for these amendments.

5.0 Economic Impacts

5.1 Socioeconomic Impacts

Section 40728.5 of the California Health and Safety Code requires an air district to assess the socioeconomic impacts of the adoption, amendment or repeal of a rule if the rule is one that “will significantly affect air quality or emissions limitations”. Applied Economic Development of Walnut Creek, California has prepared a socioeconomic analysis of the proposed amendments to Rule 8-5. The analysis concludes that the affected refineries should be able to absorb the costs of compliance with the proposed rule without significant economic dislocation or loss of jobs.

5.2 Incremental Costs

Under Health and Safety Code § 40920.6, an air district is required to perform an incremental cost analysis for any proposed best available retrofit control technology rule or feasible measure. The air district must: (1) identify one or more control options achieving the emission reduction objectives for the proposed rule, (2) determine the cost effectiveness for each option, and (3) calculate the incremental cost effectiveness for each option. To determine incremental costs, the

air district must “calculate the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control option as compared to the next less expensive control option.” These provisions were intended to encourage air districts to consider whether less stringent controls that come at vastly reduced cost may be a better policy choice if they achieve much of the emission reduction sought.

In this case, the BAAQMD is proposing the adoption of controls included as feasible measures in the Bay Area 2005 Ozone Strategy. These controls are not emissions standards but instead involve incentives for more frequent inspections, structural integrity requirements, and work practice requirements related to tank cleaning and degassing. Because the proposed controls are not emission standards that can be achieved by a variety of control options, the BAAQMD is unable to identify any alternative that "achieves the emission reduction objectives for the regulation." As a result, the BAAQMD cannot calculate an incremental cost effectiveness for the proposed controls. There are no alternatives available that achieve the emission reduction objectives for the regulation.

5.3 Implementation Costs

This section describes costs, both to affected tank operators and to the BAAQMD, for each proposed amendment.

5.3.1 Voluntary Self-Inspection and Repair Program

There are approximately 500 floating roof tanks in the District. If these tanks were all included in the proposed Self-Inspection and Repair Program, an additional 250 inspections would be required each year (2 inspections per year at 25% of the total number of tanks) in addition to the inspections already mandated by the rule. An inspector would require about an hour and a half for each tank inspection, including set up time if incorporated into an existing inspection program. At a cost of \$65,000 per employee, and assuming 2,000 working hours per year, the cost of these extra inspections would be about \$50 each ($\$65,000/2000 * 1.5 = \48.75), or approximately \$12,200 per year at all affected facilities for 250 inspections.

If tank operators are able to repair self-discovered conditions that do not comply with Rule 8-5 standards without being subject to enforcement action, this could reduce the amount of fines associated with tanks subject to Rule 8-5. However, since the proposed program only allows minor violations to be repaired without enforcement action, and since the number of these violations has historically not been excessive, the loss of revenue from fines is expected to be more than offset by the reduced costs to the BAAQMD for discovering and documenting violations and processing resulting violation notices.

5.3.2 Structural Integrity Requirements for Tank Shells and Flotation Pontoons

No additional costs to tank operators are projected for the proposed tank shell integrity requirements since tank shell leaks are very uncommon and since an operator probably would have initiated a tank repair on a leaking shell even in the absence of the proposed requirements in order to minimize product loss.

Also, no additional costs to tank operators are projected for the proposed leaking pontoon emission control requirements since the BAAQMD has historically prohibited leaking pontoons.

5.3.3 Tank Cleaning and Sludge Handling Requirements

No additional costs to tank operators are projected for the proposed tank cleaning and sludge handling requirements since tank cleaning operations in the Bay Area already generally comply with these requirements.

5.3.4 Monitoring of Tank Degassing Emission Control Effectiveness

No additional costs to tank operators are projected for the proposed monitoring of emission control systems during tank degassing since these requirements will replace an annual source testing requirement and are not expected to be significantly more expensive.

6.0 Environmental Impacts

Pursuant to the California Environmental Quality Act, the BAAQMD has had an initial study for the proposed amendments prepared by Environmental Audit, Inc. The initial study concludes that there are no potential significant adverse environmental impacts associated with the proposed amendments. A negative declaration is proposed for adoption by the BAAQMD Board of Directors. The initial study and negative declaration is to be circulated for public comment during the period from September 18, 2006 to October 10, 2006.

7.0 Regulatory Impacts

Section 40727.2 of the Health and Safety Code requires an air district, in adopting, amending, or repealing an air district regulation, to identify existing federal and district air pollution control requirements for the equipment or source type affected by the proposed change in air district rules. The air district must then note any differences between these existing requirements and the requirements imposed by the proposed change.

7.1 BAAQMD Regulation 8, Rule 7

Aboveground and underground gasoline storage tanks at gasoline dispensing facilities are regulated by BAAQMD Regulation 8, Rule 7: *Gasoline Dispensing Facilities*. Rule 8-5 currently includes an exemption for underground storage tanks at such facilities, and the proposed amendments would extend this exemption to also apply to aboveground tanks. This amendment is discussed in Section 3.1 of this report. The basic tank size exemption in Rule 8-5 is for tanks with a capacity less than 264 gallons. In Rule 8-7, the exemption is for tanks with a capacity less than 250 gallons. Therefore, the proposed extension of the Rule 8-5 exemption to aboveground gasoline tanks subject to Rule 8-7 is not expected to relieve any tanks of regulation based on tank capacity.

7.2 BAAQMD Regulation 8, Rule 18

Emissions of organic compounds from leaking equipment at petroleum refineries, chemical plants, bulk plants and bulk terminals are regulated by BAAQMD Regulation 8, Rule 18: *Equipment Leaks*. Rule 8-5 also imposes some leak standards on equipment associated with organic liquid storage tanks. To prevent a conflict between these rules, Rule 8-18 includes an exemption for “appurtenances on storage tanks including pressure relief devices, which are subject to requirements contained in Regulation 8, Rule 5.” The proposed amendments include

several changes to clarify which appurtenances have leak standards in Rule 8-5. One change, to Section 8-5-118, is discussed in Section 3.6.3.

7.3 Federal Leak Detection Method, 40 CFR Part 60, Appendix A, Method 21

Leaks of organic materials are required to be quantified in Rule 8-5 using EPA Reference Method 21. This method involves placing an instrument probe at the leak interface of a potentially leaking component. Rule 8-5 currently defines “gas tight” as a concentration less than 100 ppm, “measured 1 cm or less from any source”. This 1 cm allowance does not conform to Method 21, and is proposed to be deleted. This proposed change is discussed in Section 3.6.4 of this report.

7.4 Federal NSPS 40 CFR Part 60, Subparts Ka and Kb

Some tanks that are subject to Rule 8-5 are also subject to New Source Performance Standards (NSPS) Ka or Kb, which provide construction requirements for new tanks. NSPS Ka applies to storage tanks for petroleum liquids, excluding fuel oils, with a capacity greater than 40,000 gallons for which construction commenced after May 18, 1978. NSPS Kb applies to storage tanks for organic liquids with a capacity greater than 19,803 gallons for which construction commenced after July 23, 1984. The general design requirements of both NSPS Ka and Kb are incorporated into Rule 8-5. However, the NSPS do not address most of the conditions and operations addressed by the proposed amendments, including tank shell and flotation pontoon integrity or tank degassing and cleaning. Subpart Kb allows a 45-day period to repair self-discovered violations of design standards, seal integrity standards and seal gap standards which exceeds the proposed limit in Rule 8-5 of 48 hours. Subpart Ka does not specify a repair period for standard violations, but allows up to 60 days for an operator to report the self-discovered violation and describe actions necessary to correct the violation.

8.0 Rule Development Process

The BAAQMD convened a technical workgroup of interested stakeholders to participate in the development of the proposed amendments. Workgroup meetings were held on April 23, 2003 and May 9, 2005. Based on the input received at these meetings, and additional meetings with stakeholders in 2006, a draft rule was presented at a public workshop that was held on July 19, 2006 in Martinez, CA. Following this workshop, BAAQMD staff considered written comments received from stakeholders, including the Western States Petroleum Association and U.S. EPA, in the preparation of the proposed amendments.

9.0 Conclusion

Pursuant to Section 40727 of the California Health and Safety Code, the proposed rule must meet findings of necessity, authority, clarity, consistency, non-duplication, and reference. The proposed amendments to Regulation 8, Rule 5 are:

- Necessary to limit emissions of volatile organic compounds, a primary precursor to ground-level ozone formation, and to meet the requirements of the Bay Area 2005 Ozone Strategy;
- Authorized under Sections 40000, 40001, 40702, and 40725 through 40728 of the California Health and Safety Code;
- Written or displayed so that its meaning can be easily understood by the persons directly

affected by it;

- Consistent with other BAAQMD rules, and not in conflict with state or federal law;
- Non-duplicative of other statutes, rules or regulations; and
- Implementing, interpreting or making specific the provisions of the California Health and Safety Code Sections 40000 and 40702.

The proposed new rule has met all legal noticing requirements, has been discussed with the regulated community, and it reflects the input and comments of many affected and interested parties. BAAQMD staff recommends adoption of proposed amendments to Regulation 8, Rule 5: *Storage of Organic Liquids*.

10.0 References

Bay Area Air Quality Management: *Bay Area 2005 Ozone Strategy*; January 2006

Bay Area Air Quality Management: *Bay Area 2001 Ozone Attainment Plan*; October 2001

Bay Area Air Quality Management District: *Technical Assessment Document for Further Study Measure FS 10 from Bay Area 2001 Ozone Attainment Plan*; January 2004

Ventura County Air Pollution Control District: Rule 74-26: *Crude Oil Storage Tank Degassing Operations*; November 8, 1994.

Ventura County Air Pollution Control District: Rule 74-26: *Gasoline and ROC Liquid Storage Tank Degassing Operations*; November 8, 1994.

U. S. Environmental Protection Agency: AP-42, 5th Edition: *Compilation of Air Pollutant Emission Factors*, Volume 1, Chapter 7.1: *Organic Liquid Storage Tanks*; September, 1997.

Appendix I.0 Comments and Responses

[To be added]